# TASK ORDER

## 47QFCA-18-F-0036

# Database and Middleware Services (DMS)

**in support of:**

# General Services Administration
# Office of the Chief Information Officer
# (GSA IT)

**Awarded to:**

**Alliant Solutions Partners, LLC**

**Alliant Small Business**
**Governmentwide Acquisition Contract (GWAC) Number GS-06F-0662Z**

**Conducted under Federal Acquisition Regulation (FAR) 16.505**

**Issued by:**
**The Federal Systems Integration and Management Center (FEDSIM)**
**1800 F Street, NW (QF0B)**
**Washington, D.C. 20405**

**MOD PA08**
**FEDSIM Project Number GS00865**
**MODIFICATION PA08**

## C.1 BACKGROUND

General Services Administration's Office of the Chief Information Office (GSA IT) is responsible for the management of a secure Information Technology (IT) infrastructure, and ensures this infrastructure provides GSA with the IT solutions which ensure mission success across GSA.

The GSA IT Database and Middleware Services (DMS) supports most GSA applications. This support extends to approximately 1350 Oracle, Sybase, Microsoft Structured Query Language (MS SQL), and MySQL databases; as well as 365 middleware instances consisting of JBoss, Apache, and ColdFusion application server software. DMS patches, upgrades, and maintains enterprise databases, monitors database performance, and manages Information Technology Infrastructure Library (ITIL) processes supporting capacity and configuration management.

### C.1.1 PURPOSE

GSA IT requires IT services to manage, support, and modernize its database and application middleware server infrastructure. GSA IT intends to take advantage of new technologies and industry best practices to better leverage database infrastructure support services such as an ITIL management framework across IT services.

This TO will allow the DMS group to keep pace with advancements in the IT industry, maintain the steady state of the database infrastructure, and position DMS to take on additional work as part of the Federal Government restructuring.

### C.1.2 AGENCY MISSION

GSA IT provides enterprise-wide IT service delivery and management to its large, diverse, and mobile customer base worldwide. GSA IT focuses on delivering innovative, mobile-ready, and collaborative solutions for its users and strives to be the technology leader in agility, efficiency, mobility, and productivity. GSA IT provides:

a. Enterprise-wide IT infrastructure services.
b. IT portfolio management support (capital planning and investment control).
c. IT security programs and security management support.
d. Enterprise architecture to support and link GSA business needs to IT systems and services.
e. Enterprise applications support for email, collaboration, and identity management.

The following GSA IT principles guide the overall operations for the unified organization:

a. Service-delivery mindset: GSA IT delivers high-quality and reliable IT services to its customers.
b. Adaptable organization: GSA IT quickly and effectively responds to business priorities.
c. Technology mastery: GSA IT has the business and IT skills to apply the right technologies to solve business challenges in the most cost-effective manner.
d. Governance and data-driven decisions: GSA IT makes data-driven decisions using an enterprise governance framework.

e. Standardization and continuous improvement: GSA IT implements mature processes and standards that are maintained through feedback mechanisms.
f. People-centric focus: GSA IT invests in its people.

## C.2 SCOPE

The contractor shall perform administration, enhancement, maintenance, and managements services, and program management for the current and future database and middleware environment. The contractor shall also provide support for modernizing and improving the efficiency of the database and middleware environment.

GSA IT operates 24 hours per day, seven days per week. The contractor shall provide support eight hours per day, covering the core business hours between 9:00am and 3:00pm Eastern Time, Monday through Friday; and on-call support during non-business hours to assist in the operation and maintenance of GSA designated databases, database and application servers, and supported third-party products. This support shall be located within the continental United States.

## C.3 CURRENT INFORMATION TECHNOLOGY (IT)/NETWORK ENVIRONMENT

GSA IT has implemented four main database server environments (i.e., Production, and Continuity of Operations (COOP), Test, and Development), various programming languages, and third party products to meet GSA requirements. Additional environments such as pre-production (staging) may emerge in the future.

### C.3.1 DATABASE ENVIRONMENTS

The following is a breakout of the servers and databases supported by DMS

a. Sybase – 26 servers hosting 650+ databases
b. Oracle – 38 servers hosting 80+ databases
c. MS SQL – 65 servers hosting 600+ databases
d. MySQL – 6 servers hosting 20+ databases

#### C.3.1.1 SYBASE ENVIRONMENT

GSA has implemented the following Sybase products:

a. Sybase Adaptive Server Enterprise (ASE) is a high-performance relational database management system for mission-critical, data-intensive environments. It ensures highest operational efficiency and throughput on a broad range of platforms.
b. Sybase Replication Server provides transactional database replication between ASE server instances and guarantees zero operational downtime of the database.
c. Sybase IQ is a data warehouse system used by GSA. The data warehouse system is leveraged by the GSA Business Intelligence team to run ad hoc and canned reports against the GSA Enterprise Data Mart. The application used for this function is Business Objects. Extract Transform and Load (ETL) tools are used to load data into Sybase IQ. Support for the Business Objects Commercial off-the-shelf (COTS) package and ancillary components is not within the scope of this TO. Sybase Open Client is a versatile

programming interface allowing transparent access to any data source, information application, or system service.

d. Sybase Database, Replication, and Application.
e. GSA has one application known as FSS On-line, which runs in PowerBuilder. Migration away from PowerBuilder during the TO period of performance is expected. DMS only supports the licensing of the PowerBuilder product.

### C.3.1.2 ORACLE ENVIRONMENT

GSA has implemented the following Oracle products in support of mission-critical applications and COTS software:

a. Oracle Enterprise Manager (OEM)/Grid Control is Oracle's single, integrated solution for managing all aspects of the Oracle database and the applications running on it.
b. Oracle Data Guard ensures high availability, data protection, and disaster recovery for enterprise data. Data Guard ensures that standby databases are transactionally consistent copies of the production database. GSA leverages Data Guard for its Production environment to replicate transactions from its primary database to the secondary database.
c. GSA leverages Oracle SQL Developer to allow developers to browse database objects, run SQL statements and SQL scripts, edit and debug PL/SQL statements, manipulate and export data, and view and create reports.
d. Oracle Recovery manager (RMAN) is a platform independent utility for coordinating backups and restore procedures across multiple GSA servers. GSA uses RMAN to perform incremental and full database backups.

### C.3.1.3 MS SQL ENVIRONMENT

GSA has implemented the following MS SQL Server products to support certain individual and departmental applications:

a. SQL Server Management Studio is the primary administrative tool for SQL Server and provides a Microsoft Management Console (MMC)-compliant user interface that allows users to:
    1. Define groups of SQL Server instances.
    2. Register individual servers in a group.
    3. Configure all SQL Server options for each registered serve.
    4. Create and administer all SQL Server databases, objects, logins, users, and permissions in each registered server.
    5. Define and execute all SQL Server administrative tasks on each registered server.
    6. Design and test SQL statements, batches, and scripts interactively by invoking SQL Query Analyzer.
    7. Invoke the various wizards defined for SQL Server.
b. GSA uses MS SQL database mirroring to transfer transaction log records directly from one server to another. This enables GSA to quickly failover to the standby server.

### C.3.1.4 MySQL ENVIRONMENTS

GSA is placing a greater emphasis on open source database solutions due to higher availability and ease of replication. With this in mind, GSA has implemented, and is continuing to expand, its MySQL Server Services Support model to move beyond the current individual and departmental applications, with a goal to transition to a MySQL Enterprise solution. GSA has implemented MySQL Workbench which provides Database Administrators (DBAs) and developers an integrated tools environment for:

a. Database Design and Modeling
b. SQL Development
c. Support SnapManager for MySQL database snapshot
d. Database Administration

### C.3.1.5 OTHER DATABASE ENVIRONMENTS

GSA supports a small group of other databases such as PostgreSQL, AWS RDS, Aurora, Dynomo, TitanDB, MongoDB, Redshift, MariaDB, Paradox, Microsoft Access, and Percona.

### C.3.1.6 SERVER ENVIRONMENTS

GSA databases, database servers, and application servers are hosted on servers located in GSA facilities or at GSA-managed external data center facilities. GSA production databases are hosted in Stennis, Mississippi (MS), Research Triangle Park, North Carolina (NC), and Fort Worth, Texas (TX).

Databases supporting major applications (i.e., GSA Advantage, Enterprise Content Management System (ECMS), etc.) are architected to operate in separate zones and are not shared with other applications. Production databases are replicated from the primary site (Stennis, MS) to the COOP site (Research Triangle Park, NC) using Sybase Replication server and RecoverPoint Appliance (RPA). GSA databases are architected using a “warm standby” configuration. The GSA data warehouse, which leverages Sybase IQ, is replicated at the block level.

The GSA Oracle infrastructure is replicated using Oracle DataGuard, which replicates from the primary site to the secondary (COOP) site, and Oracle GoldenGate replicates from the primary site to the Linux site. In some cases, GSA uses block-level replication for some databases. The EMC RecoverPoint Appliance is used for block-level replication.

GSA has implemented three types of operating systems to support GSA applications and databases:

a. Unix servers M8000 and M5000, operating under Solaris 10 – Sybase ASE, Oracle, Sybase IQ
    1. The major application using Sybase is GSA Advantage. Other applications within GSA also leverage the Sybase database.
    2. Sybase IQ is used by primarily by GSA Business Intelligence tools, in particular, Business Objects, and some GSA Advantage applications.
    3. GSA leverages Oracle for Enterprise Acquisition System (EAS), ECMS (Document Digitization System).

b. Windows servers
    1. GSA runs Business Objects, VisualCron, Connect Direct, and other technologies on Windows.
c. Linux servers – Sybase, MySQL, Postgres, Oracle databases, and monitoring tools.
    1. Eoffer Esign databases run on a Linux platform.
d. Web Servers such as Apache HTTPD and Windows IIS to delivery web tier offerings for content and application sites.

## C.3.2 MIDDLEWARE ENVIRONMENTS

### C.3.2.1 RED HAT JBOSS PRODUCTS

GSA has implemented the following Red Hat JBoss products:

a. JBoss Enterprise Application Platform (EAP) is a Java EE-based application server runtime platform used for building, deploying, and hosting highly-transactional Java applications and services. GSA actively has EAP 5.x and 6.x versions deployed.
b. JBoss Service-Oriented Architecture Platform (SOA-P) is Java EE-based SOA software. The JBoss SOA-P enables enterprises to integrate services, handle business events, automate business processes, and link IT resources, data, services, and applications. GSA has multiple instances of SOA-P 5.3.x deployed.
c. JBoss Fuse is an open source, lightweight, and modular integration platform with a new-style Enterprise Service Bus (ESB) that supports integration beyond the data center. The capability to connect all enterprise assets and the ability to deploy JBoss Fuse in several different configurations advances intelligent integration to all facets of business. GSA is currently migrating from SOA-P to Fuse.

### C.3.2.2 ORACLE FUSION MIDDLEWARE

GSA has implemented the following Oracle Fusion Middleware products.

a. Oracle Weblogic Server is a Java EE application server runtime for building and deploying enterprise applications. GSA currently has WebLogic 11g and 12c deployed.
b. Oracle Forms and Reports are a Java container based runtime that allows for applications and reports to be developed on top of Oracle databases. They deliver client-server level functionality in a web app.
c. Oracle Rest Data Services (ORDS) provides easily deployed restful interfaces for oracle databases.
d. Oracle HTTP Server is a web server based on the Apache HTTP Server, created by the Oracle Technology Network. The web server is based on Apache version 2.2. It is a Web Tier component of the Oracle Fusion Middleware suite and sits in front of Weblogic in the GSA deployment.

### C.3.2.3 WEB / APPLICATION SERVER TECHNOLOGIES

GSA has implemented the following additional Middleware web and application server products.

a. Apache Tomcat

b. Adobe ColdFusion
c. Microsoft IIS
d. Apache HTTPD
e. NGINX

### C.3.2.4 CONTENT MANAGEMENT SYSTEM TECHNOLOGIES

GSA has implemented the following additional Content Management System products:

a. Drupal is an open source content management system developed in PHP. GSA has deployed Drupal for hosting a few websites that are content only for its applications.
b. Wordpress is a free, open source content management system (CMS) based on PHP. GSA has deployed several websites for hosting that are content only for its customer portals.

### C.3.2.5 FILE TRANSFER TECHNOLOGIES / BATCH AUTOMATION AND WORKLOAD SCHEDULING

GSA has implemented the following additional file transfer technologies:

a. IBM Sterling Connect Direct for Windows manages file transfers and integrations with tools to support business needs.
b. OpenSSH Client / Server (scp, sftp, ssh) provides support for managing the file transfer ecosystem by provision accounts, establishing new interfaces, and providing automation support to file transfer initiatives.
c. VisualCron provides support for multiple VisualCron environments including the job deployment life cycle.

### C.3.2.6 BUSINESS INTELLIGENCE TOOLS

GSA has implemented the following SAP Business Objects for Business Intelligence tools:

a. SAP Business Objects - GSA currently has a small Business Objects implementation managed by DMS effort.
b. GSA is investigating other Business Intelligence tools that may emerge in the future and require support such as:
    1. Microstrategies
    2. Pentaho
    3. Tableau

## C.4 OBJECTIVE

The objectives of this TO are to:

a. Consolidate and optimize the current GSA database and middleware infrastructure to achieve economies of scale and management efficiencies.
b. Optimize monitoring to enhance support of the database and middleware systems.
c. Introduce new tools to automate the current database and middleware management process, in order to improve availability and troubleshooting ability.

d. Conduct comparative benchmarks of IT performance.
e. Ensure flexibility to respond to emerging technologies.
f. Understand the impact of technological advances on future organizational activities and outcomes.
g. Acquire, implement, and manage technology to meet current and future business requirements.
h. Increase the return on technology investments.
i. Ensure database and middleware components are secured, patched, and not vulnerable to security attacks.
j. Ensure managed platforms are in compliance with GSA Security hardening and Federal Information Security Management Act (FISMA) controls.
k. Maintain database and middleware platforms to ensure product life cycle support is maintained unless otherwise directed by the Government.
l. Leverage critically needed database and middleware skills by encouraging knowledge transfer and cross training across platform management products, applications, and procedures.
m. Perform the task of database migration and conversation to different platforms.
n. Replicate database between different platforms.
o. Perform tasks relating to disaster recovery and contingency planning.

## C.5 TASKS

### C.5.1 TASK 1 – PROVIDE PROGRAM MANAGEMENT

The contractor shall provide program management support under this TO. This includes the management and oversight of all activities performed by contractor personnel, including subcontractors, to satisfy the requirements identified in this Performance Work Statement (PWS). The contractor shall identify a Program Manager (PM) by name who shall provide management, direction, administration, quality assurance, and leadership of the execution of this TO.

#### C.5.1.1 SUBTASK 1 – COORDINATE A PROJECT KICK-OFF MEETING

The contractor shall schedule, coordinate, and host a Project Kick-Off Meeting at the location approved by the Government (Section F, Deliverable 1.1). The meeting will provide an introduction between the contractor personnel and Government personnel who will be involved with the TO. The meeting will provide the opportunity to discuss technical, management, and security issues, and travel authorization and reporting procedures. At a minimum, the attendees shall include Key contractor Personnel, representatives from the directorates, other relevant Government personnel, and the FEDSIM Contracting Officer's Representative (COR).

At least three days prior to the Kick-Off Meeting, the contractor shall provide a Kick-Off Meeting Agenda (Section F, Deliverable 1) for review and approval by the FEDSIM COR and the GSA IT Technical Point of Contact (TPOC) prior to finalizing. The agenda shall include, at a minimum, the following topics/deliverables:

a. Points of contact (POCs) for all parties
b. Draft Project Management Plan (PMP) (Section F, Deliverable 2) and discussion including schedule, tasks, etc.
c. Personnel discussion (i.e., roles and responsibilities and lines of communication between contractor and Government)
d. Staffing Plan and status
e. Transition-In Plan (Section F, Deliverable 3) and discussion
f. Security discussion and requirements (i.e., building access, badges, Common Access Cards (CACs)), including completed security packages for Key Personnel
g. Invoicing requirements
h. Transition discussion
i. Draft Baseline Quality Management Plan (QMP) (Section F, Deliverable 4)

The Government will provide the contractor with the number of Government participants for the Kick-Off Meeting and the contractor shall provide sufficient copies of the presentation for all present.

The contractor shall draft and provide a Kick-Off Meeting minutes report documenting the Kick-Off Meeting discussion and capturing any action items.

### C.5.1.2 SUBTASK 2 – PREPARE A MONTHLY STATUS REPORT (MSR)

The contractor shall develop and provide an MSR (Section J, Attachment E) (Section F, Deliverable 5). The MSR shall include the following:

a. Activities during reporting period, by task (include on-going activities, new activities, activities completed, and progress to date on all above mentioned activities). Each section shall start with a brief description of the task.
b. Problems and corrective actions taken. Also include issues or concerns and proposed resolutions to address them.
c. Personnel gains, losses, and status (security clearance, etc.).
d. Government actions required.
e. Schedule (show major tasks, milestones, and deliverables; planned and actual start and completion dates for each).
f. Summary of trips taken, conferences attended, etc. (attach Trip Reports to the MSR for reporting period).
g. Database operational reports
h. Middleware operational reports
i. Accumulated invoiced cost for each CLIN up to the previous month.
j. Projected cost of each CLIN for the current month.
k. Comparison data/monthly performance reports.

### C.5.1.3 SUBTASK 3 – CONVENE TECHNICAL STATUS MEETINGS

The contractor PM shall convene a monthly Technical Status Meeting with the FEDSIM COR, GSA IT TPOC, and other Government stakeholders. The purpose of this meeting is to ensure all

stakeholders are informed of the monthly activities and MSR, provide opportunities to identify other activities and establish priorities, and coordinate resolution of identified problems or opportunities. The contractor PM shall provide minutes of these meetings, including attendance, issues discussed, decisions made, and action items assigned, to the FEDSIM COR within five workdays following the meeting (Section F, Deliverable 6).

### C.5.1.4 SUBTASK 4 – PREPARE A PROJECT MANAGEMENT PLAN (PMP)

The contractor shall document all support requirements in a PMP. The contractor shall provide the Government with a draft PMP (Section F, Deliverable 2) on which the Government will make comments. The final PMP (Section F, Deliverable 2.1) shall incorporate the Government's comments.

The PMP shall:

a. Describe the proposed management approach.
b. Contain detailed Standard Operating Procedures (SOPs) for all tasks.
c. Include milestones, tasks, and subtasks required in this TO.
d. Provide for an overall Work Breakdown Structure (WBS) and associated responsibilities and partnerships between Government organizations.
e. Describe in detail the contractor's approach to risk management under this TO.
f. Describe in detail the contractor's approach to communications, including processes, procedures, communication approach, and other rules of engagement between the contractor and the Government.
g. Include the contractor's Baseline Quality Management Plan (QMP).

### C.5.1.5 SUBTASK 5 – UPDATE THE PROJECT MANAGEMENT PLAN (PMP)

The PMP is an evolutionary document that shall be updated annually at a minimum (Section F, Deliverable 2.2). The contractor shall work from the latest Government-approved version of the PMP.

### C.5.1.6 SUBTASK 6 – PREPARE TRIP REPORTS

Travel shall be approved in writing by the GSA COR in advance of any travel. Travel times, other than during the standard work week, may be performed for the expeditious rendering of services, and shall be performed to the extent such travel is specifically authorized by the FEDSIM COR only.

Long-distance travel is considered greater than 50 miles from the contractor's primary place of performance.

The Government will identify the need for a Trip Report when the request for travel is submitted (Section F, Deliverable 7). The contractor shall keep a summary of all long-distance travel including, but not limited to, the name of the employee, location of travel, duration of trip, and POC at travel location. Trip reports shall also contain Government approval authority, total cost of the trip, a detailed description of the purpose of the trip, and any knowledge gained. At a minimum, trip reports shall be prepared with the information provided in Section J, Deliverable G.

### C.5.1.7 SUBTASK 7 – UPDATE BASELINE QUALITY MANAGEMENT PLAN (QMP)

The contractor shall update the QMP submitted with its proposal (Section F, Deliverable 4) and provide a final baseline QMP as required in Section F (Section F, Deliverable 4.1). The contractor shall periodically update the QMP, as required in Section F (Section F, Deliverable 4.2), as changes in program processes are identified.

Within the QMP, the contractor shall identify its approach for providing quality control in meeting the requirements of the TO. The contractor's QMP shall describe its quality control methodology for accomplishing TO performance expectations and objectives. The contractor shall fully discuss its validated processes and procedures that provide high quality performance for each Task Area. The QMP shall describe how the processes integrate with the Government's requirements.

### C.5.1.8 SUBTASK 8 – PREPARE AN INTEGRATION AND TESTING PLAN

The contractor shall document all integration and testing requirements in an Integration and Testing Plan (Test Plan). The contractor shall provide the Government with a draft Test Plan (Section F, Deliverable 8) on which the Government will make comments. The final Test Plan (Section F, Deliverable 8.1) shall incorporate the Government's comments.

The Test Plan shall include:

a. Management of integration test environment.
b. Overview of integration and security testing processes.
c. System component testing for compliance with GSA and Federal security rules, regulations, and procedures.
d. Development, conduct, and documentation of any User Acceptance Testing.

The contractor shall communicate the overall impact and potential risk to system components prior to implementing any changes to the database infrastructure.

### C.5.1.9 SUBTASK 9 – MANAGE AND MAINTAIN OPERATIONAL DOCUMENTATION

The contractor shall create and maintain files that document the processing of work products, deliverables, and other associated information pertaining to tasks performed under this TO. The contractor shall be familiar with the National Institutes of Standards and Technology (NIST) and FISMA information assurance publications and regulations. The contractor shall assist DMS in the preparation of documentation for system certification, including, but not limited to:

a. The latest version of all specifications, databases, and software that define or implement designated systems.
b. Information Security Plan of Action and Milestones (POA&M) documents.
c. System scanning reports.
d. Tracking and reporting of vulnerability remediation.

### C.5.1.10 SUBTASK 10 – MANAGE PROJECT TEAM WORKFLOW ACTIVITIES

The contractor shall provide coordination of team workflow activities, such as team meeting and project coordination, including:

a. Creating and updating project plans and schedules.
b. Updating Task Ticketing.
c. Scheduling and facilitating project meetings.
d. Documenting rationale for technical program decisions.
e. Preparing and distributing TO work products and deliverables.
f. Preparing and distributing Operational Readiness Review (ORR) reports.

### C.5.1.11 SUBTASK 11 – TRANSITION-IN

The contractor shall provide a draft Transition-In Plan as part of the proposal. The final Transition-In Plan shall be delivered as required in Section F, Deliverable 3. The contractor shall ensure that there will be minimum service disruption to vital Government business and no service degradation during and after transition. The contractor shall implement its Transition-In Plan upon final approval and all transition activities shall be completed 30 days after approval of the final Transition-In Plan (Section F, Deliverable 3).

The Transition-In Plan shall contain:

a. Schedule of milestones for transition activities, including all gate reviews
b. Database/middleware ownership
c. Government-Furnished Property (GFP)/Space
d. Transition schedule with focus on business continuity
e. Impacts of transition

### C.5.1.12 SUBTASK 12 – TRANSITION-OUT

The contractor shall provide Transition-Out support when required by the Government. The Transition-Out Plan shall facilitate the accomplishment of a seamless transition from the incumbent to an incoming contractor/Government personnel at the expiration of the TO. The contractor shall provide a draft Transition-Out Plan within six months of Project Start (PS) (Section F, Deliverable 10). The Government will work with the contractor to finalize the Transition-Out Plan (Section F, Deliverable 10.1) in accordance with Section E. At a minimum, this Plan shall be reviewed and updated on an annual basis (Section F, Deliverable 10.2). Additionally, the Transition-Out Plan shall be reviewed and updated quarterly during the final Option Period (Section F, Deliverable 10.2).

In the Transition-Out Plan, the contractor shall identify how it will coordinate with the incoming contractor and/or Government personnel to transfer knowledge regarding the following:

a. Project management processes
b. Points of contact
c. Location of technical and project management documentation
d. Status of ongoing technical initiatives

e. Appropriate contractor to contractor coordination to ensure a seamless transition
f. Transition of Key Personnel
g. Schedules and milestones
h. Actions required of the Government

The contractor shall also establish and maintain effective communication with the incoming contractor/Government personnel for the period of the transition via weekly status meetings or as often as necessary to ensure a seamless transition-out.

The contractor shall implement its Transition-Out Plan NLT six months prior to expiration of the TO.

## C.5.2 TASK 2 – DATABASE SERVICES

### C.5.2.1 SUBTASK 1 – DATABASE AND APPLICATION SERVER ADMINISTRATION

For designated servers, the contractor shall manage and maintain all production and non-production databases and database servers. The contractor shall manage, maintain, and administer physical data storage, access, and security in support of databases. The contractor shall perform database backup and recovery; configure database parameters, and prototype database designs against logical data models. The contractor shall optimize database access and allocate database resources for optimum configuration, database performance, and cost efficiency. The contractor shall work with GSA to determine the best approaches for database operations and maintenance activities. The contractor shall perform the following functions:

a. Operate and maintain designated database servers, supporting utilities, and third party products.
b. Perform all required database configuration updates as scheduled. Perform all required database backups as scheduled. These activities shall include:
    1. Setup and administer utilities for backup and recovery, with priority placed on business continuity.
    2. Load and unload database server databases.
    3. Perform test database restores to ensure integrity of system backups.
c. Schedule, conduct, and synchronize database replication activities.
d. Monitor and manage databases daily (Databases are replicated to the COOP site 24x7).
e. Analyze and resolve database server problems that may arise.
f. Perform all required database configuration updates and performance tuning needed for databases to deliver both high response time and high availability. This includes the management, allocation, and control of system resources. Work collaboratively with application groups to assist with tuning and optimizing SQL code and queries. Proactively monitor SQL statements and stored procedures for performance issues. Tune SQL and stored procedures as appropriate.
g. Perform database upgrades and changes as scheduled and coordinated by GSA. Document all changes in accordance with GSA approved standards and procedures.
h. Evaluate new database server hardware and software and assist in evaluating and coordinating upgrade and/or replacement of database products.

i. Ensure databases are performing optimally by checking and monitoring.
j. Work collaboratively with other teams to assess the performance of the Storage Area Network (SAN).
k. Leverage the sophisticated capabilities of the SAN, in particular capabilities such as SAN Mirroring technology, SAN cloning technology and block-level replication (i.e., SRDF/A, RecoverPoint, etc.).
l. Assist in the preparation of capacity plans and analysis of database and application server performance improvements.
m. Develop, implement, and lead, where appropriate, Disaster Recovery (DR) and COOP planning and testing activities for production and nonproduction databases. DR and COOP testing shall be conducted every six months at a minimum.
n. Implement database security procedures and requirements and assist in implementing application and infrastructure security as required.
o. Perform the task of database migration and conversation to different platforms.
p. Replicate database between different platforms.
q. Perform quarterly database restore test.
r. Support database servers/data center move.
s. Change database system password according to GSA regulation and schedule.
t. Install and configure Database and Middleware monitor tools on request.
u. Document all database and database server actions in a manner consistent with:
    1. Standards and procedures.
    2. Systems life cycles and change management procedures.
    3. Industry-leading best practices.

### C.5.2.2 SUBTASK 2 – DATABASE AND APPLICATION SERVER TECHNICAL ARCHITECTURE SERVICES

The contractor shall be responsible for reviewing and proposing optimized database, database server platforms, and supporting infrastructure products. The contractor shall provide input and recommendations into the formulation of enterprise level information capture, access, storage, and security as it relates to database servers. The contractor shall recommend standards and define data repository, data dictionary, and data warehousing requirements.

The contractor shall recommend service levels and performance management procedures and metrics, data designs and balance/optimize data access, batch processing, and resource utilization across GSA and its many applications. The contractor shall design and construct data architectures, operational data stores, and data marts for particularly complex applications. The contractor shall recommend data modeling and database design methods and standards and shall implement improvements as directed.

At a minimum, the contractor shall provide the following services:

a. Review and recommend database administration activities, to ensure all database administration conforms to GSA approved methodologies, procedures, and best practices.

b. Recommend strategies, methodologies, and plans to enable GSA to optimize its database server and data warehouse infrastructure. Key activities include:
   1. Survey new database server technologies and make timely recommendations of new products/releases that may benefit GSA.
   2. Analyze and recommend specific database server products and techniques to be used in support of complex applications.
   3. Develop strategies to optimize GSA-wide database server infrastructure.
   4. Draft and recommend standards for data input, retrieval, transmission, and storage (e.g., to include interaction with and consideration of GSA Storage Area Networks (SANs)).
   5. Conduct benchmarks, as appropriate, to assess database performance.
   6. On an enterprise basis, allocate database resources for optimum configuration, database access, and database performance and cost.
   7. Provide SQL tuning and development expertise.
c. Ensure database parameters are tuned and optimized for GSA's complex, high transaction environment.
d. Recommend improvements to database standards and practices. Key activities include:
   1. Update and refine configuration management tools and procedures.
   2. Recommend data architecture standards, policies and procedures, and refinements to database deployment methodology, as needed.
   3. Evaluate and recommend database, application, server, and enterprise security standards.
   4. Evaluate and recommend standards and procedures guiding database backup and recovery, configuration of database parameters, and prototyping designs against logical data models.
   5. Evaluate and recommend standards and design of physical data storage, maintenance, and access, to include configuration and analysis of SAN RAID group technologies.
   6. Review and recommend improvements to IT tools supporting database problem tracking and change management.
   7. Draft and recommend checklists to guide database design reviews, implementation planning, and database recovery exercises.
e. For large, complex projects, assist GSA database, applications, and IT infrastructure staff to develop effective database designs, balancing optimization of database access with database loading and resource utilization factors in development, test and production environments. Assist implementation through all phases of the system development life cycle.
f. Develop reports and presentations for senior management, as needed for the architectural recommendations described in this subtask.

### C.5.2.3 SUBTASK 3 – PROVIDE DATABASE OPERATIONS AND ADMINISTRATION

GSA has implemented four main database server environments, various programming languages, and third party products to meet GSA requirements. GSA maintains production and non-production database environments. GSA has a Production, COOP, Test, and Development infrastructure. Additional environments such as pre-production (staging) may emerge in the future. The contractor shall provide operations and administration for the environments described below.

#### C.5.2.3.1 SYBASE SUPPORT

The contractor shall be responsible for managing, maintaining, upgrading, patching, and ensuring operational continuity of the Sybase environment, including the following:

a. The contractor shall be responsible for managing all aspects of Sybase IQ, and shall assist the application team(s) with ETL functions.
b. The contractor shall support and manage Powerbuilder client licenses, and install and configure database monitor tool on request.
c. The contractor shall support and setup Sybase/IQ Advantage and Non-Advantage Databases failover/switchover from Primary/COOP to COOP/Primary by using RecoverPoint Appliance (RPA), ASE Replication Server, or AWS tools.
d. The contractor shall perform database migrations and conversations to different platforms.
e. The contractor shall support SnapManager for ASE Sybase and IQ database snapshot.

#### C.5.2.3.2 ORACLE SUPPORT

The contractor shall be responsible for managing, maintaining, upgrading, patching, and ensuring operational continuity of the Oracle environment, including the following:

a. The contractor shall be prepared to support Oracle Streams technology. While GSA does not leverage this currently, it is anticipated that GSA may use Oracle Streams in the future.
b. The contractor shall be responsible for supporting Oracle Real Application Clusters (RAC). Oracle RAC provides a highly available, scalable, and manageable solution by sharing complete access to a single database among nodes in a cluster. GSA anticipates leveraging the capabilities of Oracle RAC in the future.
c. The contractor shall support and setup Oracle Golden Gate or AWS Database tools to replicate Databases of different platforms and perform failover/switchover between different platforms.
d. The contractor shall perform database migrations and conversations to different platforms.
e. The contractor shall support SnapManager for Oracle database snapshot.

#### C.5.2.3.3 MS SQL SERVER SUPPORT

The contractor shall be responsible for managing, maintaining, upgrading, patching, and ensuring operational continuity of the MS SQL environment, including the following:

a. Ensure high-availability for select MS SQL Database instances.
b. The contractor shall support teams with SQL tuning activities.
c. Install and configure database monitor tool on request.
d. Perform the task of database migration and conversation to different platforms
e. Support SnapManager for MS SQL database snapshot

#### C.5.2.3.4 MySQL SERVER SUPPORT

The contractor shall be responsible for managing, maintaining, upgrading, patching, migrating, and ensuring operational continuity of the MySQL environment.

#### C.5.2.3.5 OTHER DATABASE SERVER SUPPORT

The contractor shall be responsible for support including general installation, migration, maintenance, patching, upgrading, configuration, and management activities for these database and other emerging database technologies.

### C.5.2.4 SUBTASK 4 – DATABASE APPLICATION PERFORMANCE, TUNING, AND MONITORING

The contractor shall provide robust metrics for tuning to ensure optimal performance of the database environment. The contractor shall use the GSA-provided tools to capture database metrics and SQL metrics.

The contractor shall:

a. Provide relational database design assistance on table structures, primary key/foreign key, and indices with a focus on improving performance of stored procedures, functions, and triggers.
b. Review and monitor system and instance resources to ensure continuous database operations (i.e., database storage, memory, Central Processing Unit (CPU), network usage, and Input/Output (I/O) contention).
c. Develop and maintain an SQL execution plan (how data flows between primitive operations) using query analyzing tools and performing detailed cost analysis.
d. Set up page size/tablespace/index parameters based on the database environment in order to minimize disk access bottlenecks and other challenges.
e. Conduct performance issue troubleshooting and tuning for SQL statements, stored procedures, functions, and triggers for the database.
f. Perform application tuning and monitoring.
g. Inspect and fix the order of SQL execution statements to reduce incidents of inefficient memory usage.
h. Allocate current system storage and plan future storage requirements for the database.
i. Provide recommendations for the SAN environment.

j. Monitor and tune I/O activities, CPU usage, and memory usage to provide recommendations for efficient and effective performance.
k. Optimize database configuration files to improve SQL statements' efficiency and prevent deadlock, hung processes, and other performance related issues.
l. Apply wait-time-based performance methodology to enable administrators to respond before wait-time errors create end-user service failures or additional SQL tuning complications.
m. Recommend and perform database backup and consistently check best practices to avoid interference with routine application processes.
n. Perform setting and tuning of system parameters so that the operating system, network, and transaction processors are efficiently working with the database.
o. Assist with impact analysis of any changes made to database objects.
p. Optimize database disk space usage by leveraging sophisticated SAN based technologies.
q. Ensure database backups complete in a timely manner and are optimized for performance.
r. Leverage SAN based technologies to optimize database backups.
s. Monitor performance from the middleware tier to the database, including the amount of time required to commit transactions.
t. Monitor logs for critical errors (i.e., Oracle Alert log, disk space, and replication queues).
u. Monitor and track Data Manipulation Language (DML) and Data Definition Language (DDL) statements on objects and structures in a database.
v. Coordinate, assist, and/or work with all stakeholders to troubleshoot performance issues.
w. Monitor and track user privileges.

### C.5.2.5 SUBTASK 5 – DATABASE APPLICATION DEVELOPMENT SUPPORT

The contractor shall provide database support to applications development during all phases of the system development life cycle including business analysis, requirements definition, system design, data acquisition, system development, test, implementation, and maintenance. The contractor shall assist in the gathering, analysis, and normalization of relevant information related to business processes, functions, and operations in order to optimize both database and application systems effectiveness. In support of applications development, the contractor shall provide input and recommend data architecture standards and policies and procedures that support both GSA database administration and the applications development process.

The contractor shall:

a. Provide database programming support and guidance to application developers including:
    1. Provide guidance on how to make best use of database products as components of applications development.
    2. Assist with programming stored procedures in support of secure information access requirements.
    3. Assist with programming complex end user database queries and report output to meet user needs.

4. Implement, maintain, and update data dictionary capabilities to assure all system data is specified and controlled.
5. Assist in all phases of database and applications testing including functional, operational, and stress testing.

b. Devise or modify procedures to solve problems considering database impact on computer equipment capacity, operating schedule, form of desired results, and integration of components.
c. Proactively analyze existing applications to identify database weaknesses and develop solutions for improvement.
d. Provide data modeling support and guidance to application developers. This support shall include:
    1. Analysis and development of complex logical database designs, logical data models, and relational data definitions in support of agency and customer information systems requirements.
    2. Application of data analysis methodologies and tools that depict the flow of data within and between technology systems and business functions/operations.
    3. Identify and resolve information flow, content issues, and transformation of business requirements into logical data models.
    4. Identify opportunities to reduce data redundancy.
e. In support of application development, recommend development of new databases or reuse of existing database and the specific database and application server products that best support them (e.g., Sybase vs. Oracle vs. MS SQL Server vs. MySQL).
f. Identify best sources of data feeds and interfaces to ensure feasibility and consistency with current GSA databases.
g. Define, develop, or modify database data structures by applying GSA approved development, configuration management, and change control processes. Assure all changes are documented consistent with GSA standards and procedures and best professional practice.
h. Recommend approaches for database data loads and conversions in support of application implementations.
i. Implement database updates in accordance with GSA configuration management and change control procedures and professional best practices.
j. Support maintenance of applications, as needed.
k. Adhere to GSA quality standards and procedures for reviewing database (Ensuring compliance with GSA application architecture and database standards).
l. Assist in defining and updating database and applications development guidelines and standards to reflect database best practices.
m. Document changes to database architecture, integration, and conversion plans. Develop and maintain database architecture diagrams.

### C.5.2.6 SUBTASK 6 – GENERAL APPLICATION PROGRAMMING SERVICES - TROUBLESHOOTING

The contractor shall provide application and maintenance services in support of individual applications as designated by GSA. Additionally, the contractor shall provide applications development guidance, suggested procedures, and best practices to help guide use of Java J2EE in support of GSA Internet applications. In support of application programming services and troubleshooting, the contractor shall:

a. Provide application support, maintain, test, and assist with integrating designated applications using GSA designated programming languages.
b. Provide application maintenance support to GSA's Web DBA application using Java J2EE.
c. Draft Java J2EE programming and development methodologies and procedures as well as standards for programming architectures and application code/component reuse.
d. Apply object-oriented approaches in designing, coding, testing, and debugging programs. Understand and consistently apply the attributes and processes of current application development methodologies.
e. Research and maintain knowledge in emerging application development technologies, particularly for Java J2EE, and recommend opportunities for implementation at GSA.
f. Act as an internal consultant, advocate, mentor, and change agent for introducing new application development technologies.

## C.5.3 TASK 3 - MIDDLEWARE SUPPORT SERVICES

GSA manages and provides support for multiple middleware technologies. Middleware includes but is not limited to application servers, web servers, file transfer services, batch/job automation, and content management systems. Services provided under this task will be in support of those various technologies to support the GSA mission.

### C.5.3.1 SUBTASK 1 – MIDDLEWARE SERVER ADMINISTRATION

For designated servers, the contractor shall manage and maintain all production and nonproduction middleware servers. The contractor shall manage, maintain, and administer physical data storage, access, and security in support of the middleware platforms. The contractor shall work with GSA to determine the best approaches for middleware operations and maintenance activities. The contractor shall perform the following functions:

a. Operate and maintain designated middleware servers, supporting utilities, and third party products.
b. Perform all required platform specific backups as scheduled. These activities shall include:
    1. Setup and administer utilities for backup and recovery, with priority placed on business continuity.
    2. Create and test restoration/recovery plans to ensure backup meets continuity needs.

3. Work closely with other enterprise teams (Storage Ops, Virtual Ops, Backup Ops) to leverage existing processes to achieve backup as necessary or to align with agency recommendations or best practices.

c. Monitor and manage middleware platforms daily and ensure they are performing optimally, leveraging monitoring and availability tools.
d. Analyze and resolve middleware server problems that may arise.
e. Ensure middleware servers/software is security hardened to GSA or industry best practices:
   1. Ensure middleware servers/platforms have compliant logging and log archival processes to align with GSA security requirements.
   2. Implement middleware security procedures and requirements and assist in implementing application and infrastructure security as required. Support system password changes/refreshes according to GSA regulation and schedule.
f. Perform all required configuration updates and performance tuning needed for middleware platforms to deliver both high response time and high availability. This includes the management, allocation, and control of system resources. Work collaboratively with application groups to assist with tuning and optimizing application code and processes.
g. Perform middleware platform/software upgrades, patches, and configuration changes as scheduled and coordinated by GSA. Document all changes in accordance with GSA approved standards and procedures.
h. Evaluate new server hardware and software and assist in evaluating and coordinating upgrade and/or replacement of products.
i. Work collaboratively with other teams to assess the performance underlying OS, virtualization, network, and storage environments to achieve optimal efficiency of middleware platforms.
j. Assist in the preparation of capacity plans and analysis of middleware server performance improvements.
k. Develop, implement, and lead, where appropriate, DR and COOP planning and testing activities for production and nonproduction platforms. DR and COOP testing shall be conducted every six months, at a minimum, or as directed. Perform the task of middleware migration and conversation to different platforms.
l. Work with network and security teams to deliver load-balancing solutions to highly available platforms.
m. Support and troubleshoot firewall and connection issues of hosted applications on middleware platforms.
n. Support middleware servers in data center or relocation moves.
o. Install and configure Middleware monitor tools on request.
p. Provide scripting, tooling, or processes to automate business process such as file transfer and software deployments.
q. Document all middleware server actions in a manner consistent with:
   1. Standards and procedures.
   2. Systems life cycles and change management procedures.

3. Industry-leading best practices.
4. As required, to support GSA required security documentations for audit compliance.

### 5.3.2 SUBTASK 2 – MIDDLEWARE TECHNICAL ARCHITECTURE SERVICES

The contractor shall be responsible for reviewing and proposing optimized middleware server platforms, and supporting infrastructure products. The contractor shall provide input and recommendations into the formulation of enterprise level information capture, access, storage, and security as it relates to middleware servers.

The contractor shall recommend service levels and performance management procedures and metrics, platform designs and balance/optimize data access, batch processing, and resource utilization across GSA and its many applications. The contractor shall design and construct platform architectures, clustering, and service delivery for particularly complex applications. The contractor shall:

a. Recommend strategies, methodologies, and plans to enable GSA to optimize its middleware server platforms. Key activities include:
    a. Survey new middleware technologies and make timely recommendations of new products/releases that may benefit GSA.
    b. Analyze and recommend specific server products and techniques to be used in support of complex applications.
    c. Develop strategies to optimize GSA-wide middleware server infrastructure.
    d. Draft and recommend standards for data input, retrieval, transmission, and storage.
    e. Conduct benchmarks, as appropriate, to assess web and application tier performance.
b. Ensure middleware server parameters are tuned and optimized for GSA's complex, high transaction environment.
c. Recommend improvements to standards and practices. Key activities include:
    a. Update and refine configuration management tools and procedures.
    b. Recommend architecture standards, policies and procedures, and refinements to middleware deployment methodology, as needed.
    c. Evaluate and recommend software, server, and enterprise security standards.
    d. Evaluate and recommend standards and procedures guiding backup and recovery, configuration of parameters, and prototyping designs against logical data models.
    e. Review and recommend improvements to IT tools supporting middleware problem tracking and change management.
d. For large, complex projects, assist GSA database, applications, and IT infrastructure staff to develop effective database designs, balancing optimization of database access with database loading and resource utilization factors in development, test, and production environments. Assist implementation through all phases of the system development life cycle.
e. Develop reports and presentations for senior management, as needed, for the architectural recommendations described in this subtask.
f. Support transitions to Continuous Integration and Continuous Deployment models.

g. Provide technical guidance and recommendations in cloud deployment models including container deployments and immutable infrastructure.

### C.5.3.3 SUBTASK 3 – PROVIDE MIDDLEWARE OPERATIONS AND ADMINISTRATION

#### C.5.3.3.1 RED HAT JBOSS PRODUCTS

The contractor shall be responsible for managing, maintaining, upgrading, patching, and ensuring operational continuity of the JBoss environment. Further, the contractor shall:

a. Support all aspects of the JBoss product deployments including any supplemental tools or advanced configurations such as instance and/or Java Message Service (JMS) clustering.
b. Provide instance provision (manual and/or automation), code deployments, and troubleshooting to all JBoss tools in support of the customer.
c. Support any monitoring tools, advanced reporting, and logging tools that are leveraged by developers and operations.

#### C.5.3.3.2 ORACLE FUSION MIDDLEWARE

The contractor shall be responsible for providing full life cycle support of the Oracle Fusion Middleware production scope deployed by GSA, including managing, maintaining, upgrading, patching, and ensuring operational continuity of the environment.

#### C.5.3.3.3 WEB / APPLICATION SERVER TECHNOLOGIES

For designated web/application server technologies, the contractor shall:

a. Provision and manage web and application server technologies to host a variety of applications and websites.
b. Ensure best practice security is implemented.
c. Support manual or automated provisioning of web instances using designated technologies.
d. Manage and maintain SSL configuration over web tiers to industry standards.

#### C.5.3.3.4 CONTENT MANAGEMENT SYSTEM TECHNOLOGIES

The contractor shall be responsible for managing, maintaining, upgrading, patching, and ensuring operational continuity of designated content management systems.

#### C.5.3.3.5 FILE TRANSFER TECHNOLOGIES / BATCH AUTOMATION AND WORKLOAD SCHEDULING

The contractor shall be responsible for managing, maintaining, upgrading, patching, and ensuring operational continuity of designated file transfer, batch automation, and workload scheduling technologies.

### C.5.3.3.6 BUSINESS INTELLIGENCE TOOL SETS

The contractor shall be responsible for managing, maintaining, upgrading, patching, and ensuring operational continuity of designated Business Intelligence tool sets.

### C.5.3.3.7 OTHER EMERGING MIDDLEWARE TECHNOLOGIES

GSA will likely introduce new emerging technologies during the life of the TO. The contractor shall be responsible for support including general install, migrate, manage, maintain, patch, upgrade, configure, and management activities for these other emerging middleware technologies.

## C.5.4 TASK 4 – PROVIDE CROSS FUNCTIONAL LIFE CYCLE SERVICES

In conjunction with the database services listed above, the contractor shall provide life cycle technical support to GSA business owners and applications teams for all databases, database services, and middleware software. The contractor shall adhere to ITIL v3.0 best practices as they are tailored for GSA IT. These cross functional life cycle activities include, but are not limited to the following:

a. Service Level Management
b. Capacity Management
c. Availability Management
d. IT Service Continuity Management
e. Change Management
f. Project Management
g. Release and Deployment Management
h. Service Asset and Configuration Management
i. Knowledge Management
j. Incident Management
k. Access Management
l. Problem Management

Provide timely creation, updating, maintenance, and provision of all appropriate project plans, project time and cost estimates, technical specifications, management documentation, and management reporting in a form/format that is acceptable to GSA for all database services, projects, and major service activities (e.g., Availability Management, Capacity Management, Incident Management, etc.).

### C.5.4.1 SUBTASK 1 – PLANNING AND ANALYSIS

The contractor shall provide planning and analysis associated with researching new technical trends, products, and services as related to databases and information management activities.

The contractor shall:

a. Participate in defining services and standards for Planning and Analysis activities.
b. Perform technical and Service Planning and Analysis based on GSA requirements (e.g., availability, capacity, performance, backup, and COOP and DR services).

c. Provide recommendations for new databases and data management services based on Planning and Analysis results.
d. Continuously monitor database and data management trends through independent research; document and report on products and services with potential use for GSA as they align with the GSA business and technology strategies.
e. Perform feasibility studies for the implementation of new database technologies that best meet GSA business needs and meet cost, performance, and quality objectives.
f. Adhere to GSA project requirements using contractor's project management capabilities.
g. Provide project management approved projects.
h. Participate in technical and business planning sessions to establish standards, architecture, and project initiatives.
i. Conduct regular planning for database technology refreshes and upgrades.
j. Conduct technical reviews and provide recommendations for improvements that increase efficiency and effectiveness and reduce costs per the Planning and Analysis results.

### C.5.4.2 SUBTASK 2 – REQUIREMENTS DEFINITION

The contractor shall provide requirements definition services associated with the assessment and definition of functional, performance, IT DR and COOP, and security requirements that also comply with regulatory and GSA policies. These requirements drive the technical design for the GSA environment. The contractor shall participate in defining requirements and standards, including appropriate requirements-gathering activities (e.g., focus groups and interviews). The contractor shall document requirements required to deliver services in agreed-to formats (e.g., data models, upgrade data requirements, transition requirements, etc.). The contractor shall ensure these requirements meet GSA-specific and Federal security policies. The contractor shall also define acceptance test criteria for approval.

### C.5.4.3 SUBTASK 3 – DESIGN SPECIFICATIONS

The contractor shall provide design specification services associated with translating user and information system requirements into detailed technical specifications. The contractor shall develop, document, and maintain Technical Design Plans and environment configurations based on GSA design specifications; standards and requirements, including architecture, functional performance, availability, maintainability, security and IT continuity; and DR requirements. The contractor shall determine and document required component upgrades, replacements, and/or transition specifications (e.g., hardware, software, and networks). The contractor shall conduct site surveys for design efforts and document and deliver design specifications in a Design Specifications Document.

### C.5.4.4 SUBTASK 4 – PERFORMANCE MANAGEMENT

The contractor shall provide performance management services associated with tuning database components for optimal performance. The contractor shall monitor the various software components of the GSA database environment for availability and potential error conditions.

The contractor shall collect performance metrics and monitor the performance of critical components such as databases, and database tools for Availability/Uptime, Response Time, and

End-to-end Throughput. The contractor shall report database and middleware availability, on a monthly basis. This includes Performance Analysis and Performance Reporting as stated below:

a. Performance Analysis - The contractor shall analyze performance metrics collected by the automated monitoring agents to track usage and trends. The contractor shall provide recommendations to maintain or improve performance. Reporting metrics shall collect metrics from middleware components through to the database.
b. Performance Reporting - The contractor shall prepare and submit a Performance Report that charts the actual performance of the GSA database and middleware environment within the reporting period against specific thresholds. The report shall be provided monthly and also be available via a dashboard.

The contractor shall perform the following performance management activities:

a. Maintain performance management procedures in the Standards and Procedures documentation.
b. Perform database tuning to maintain optimum performance in accordance with Change Management procedures.
c. Provide regular monitoring and reporting of database performance, utilization, and efficiency.

### C.5.4.5 SUBTASK 5 – LEVEL 2 SUPPORT

The contractor shall provide Level 2 Support to designated applications and services in order to solve issues and/or requests of information. GSA averages 3,000 tickets annually. Database ticketing has remained at a stable level, while middleware ticket volumes have increases approximately 40% over the previous five years.

The contractor shall analyze and resolve database and middleware software issues and technical problems, and answer all customer questions pertaining to problem resolution and requests for additional information for databases, database and application servers, and supporting products. Further, the contractor shall:

a. Monitor all database and middleware components 24x7 and ensure databases are replicated and synchronized 24x7.
b. Log, track, respond to, and resolve customer database support issues using the ServiceNow Help desk tool.
c. Analyze and resolve database problems that arise in the production and nonproduction environments.
d. Investigate and/or resolve problems over the phone or by going to a customer desk.
e. Gain management approval for problem correction prior to transfer to production.
f. Follow Help Desk policy and procedures regarding problem logging, status updates, and corrections.
g. Identify and analyze problems that indicate systemic problems and recommend solutions for the problems.

### C.5.5 TASK 5 – DATABASE MODERNIZATION AND CONVERSION

The contractor shall assist GSA IT in modernization and conversion planning and implementation. The contractor shall provide an architectural assessment of the GSA infrastructure and prepare Technical Design Plans for the areas listed below. The contractor shall also provide implementation services, if the Government elects to implement the contractor's recommendation:

a. Review and recommend strategies to provide high-availability for all database and middleware, especially for GSA Advantage.
b. Deliver a Technical Design Plan that discusses high-availability options for the GSA Advantage database and other databases as requested. Review and recommend alternatives to transactional based replication. For instance, the contractor shall review and recommend block-level replication strategies for databases, data warehouse and application servers, if appropriate.
c. Review, assess, and recommend alternative data warehousing strategies. Assess and evaluate data warehouse technologies and make recommendations.

#### C.5.5.1 SUBTASK 1 – PROVIDE DATABASE MODERNIZATION PLANNING AND IMPLEMENTATION

The contractor shall work collaboratively with GSA evaluating avenues to transform the way IT delivers services by extending the enterprise beyond the traditional datacenter including, but not limited to:

a. Database services in the cloud.
b. Application Services in the cloud.
c. Web services in the cloud.
d. Integration middleware as a service.
e. Databases and JBoss Instances migration and conversation to cloud platform in all environments.
f. Coordination and testing of applications after migration and conversation to cloud platform.
g. Perform all aforementioned on premise databases and JBoss instances related tasks/responsibilities in the cloud computing platform/environment, utilizing cloud tools for databases and JBoss instances monitoring, migration, tuning, backup, restore, disaster recovery, and administration, when available.

If the recommendations are approved by the Government, the contractor shall design, install, configure, and create (or convert) current system(s)/model(s) to the new solutions. If implemented, the contractor shall maintain, troubleshoot, tune, and perform backup and recovery for the new solutions.

#### C.5.5.2 SUBTASK 2 – PROVIDE DATABASE CONVERSION PLANNING AND IMPLEMENTATION

As part of the overall database environment modernization improvement effort, GSA may undertake a database platform migration from one DBMS to another (e.g., Sybase to Oracle,

Sybase to MySQL, MySQL to MS SQL, etc.). As part of this process, the contractor shall provide the following services:

a. Fully design the migration procedures and approach.
b. Develop the architecture of the target DBMS.
c. Develop a pilot/proof of concept.
d. Fully manage the approved upon migration process.
e. Implement the migration plan and fully test the DBMS conversion.
f. Provide Quality Assurance (QA) services for all migration activities.
g. Recommend and provide necessary tools for all migration activities.